



Some TOLNet science before TOLNet:

Stratospheric intrusions above JPL-Table Mountain Facility: A case study

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CONTEXT



Intrusion occurred on October 19, 2009
in the middle of the 2009 MOHAVE NDACC Campaign
(Measurements Of Humidity in the Atmosphere
and Validation Experiment)



MOHAVE 2009: Oct. 11-28, 2009



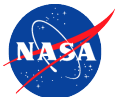
Location: *JPL Table Mountain Facility, California, 34.4N, 117.7W, alt. 2300 m*

Objectives:

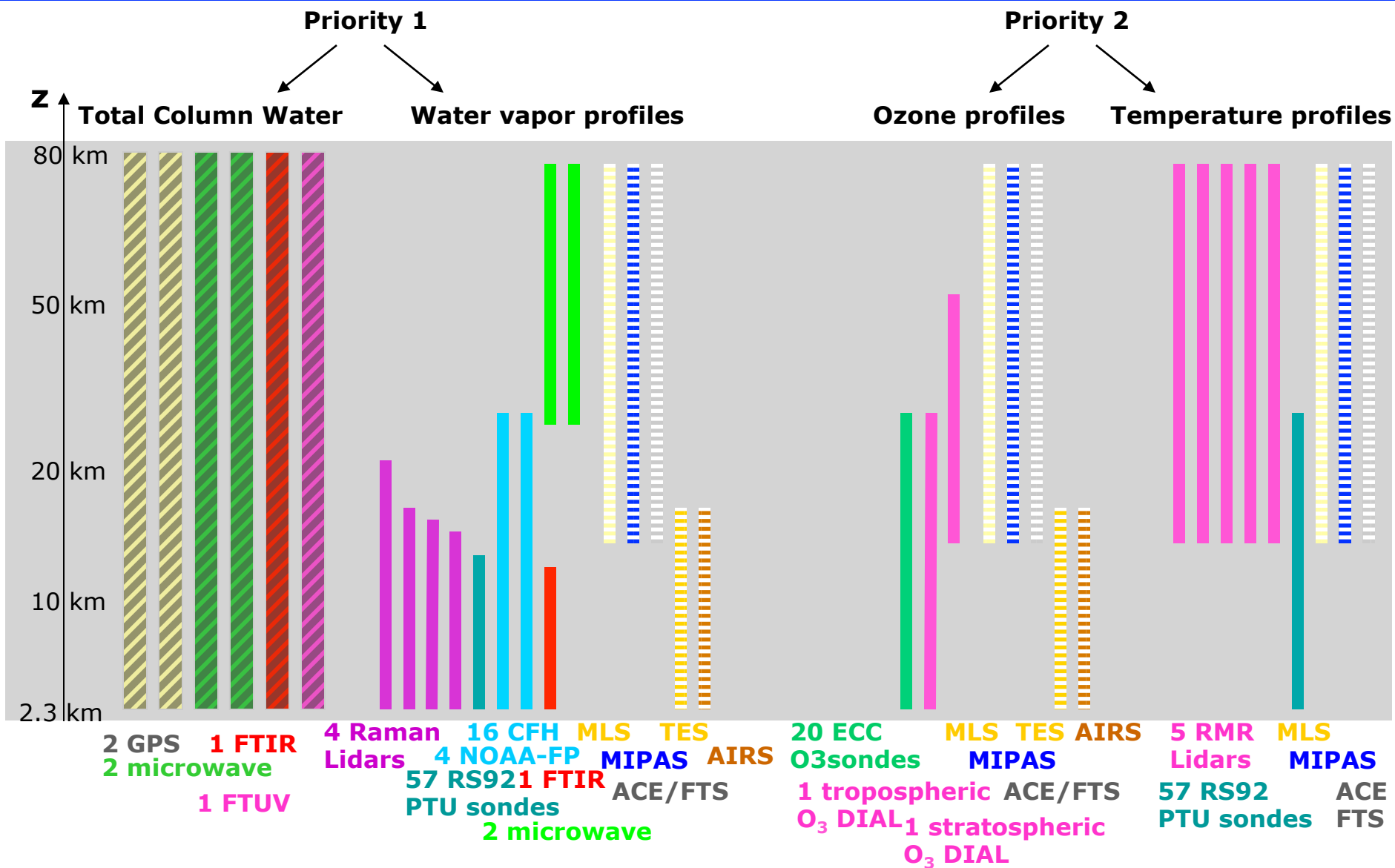
- *Validation of the NDACC JPL water vapor Raman lidar and two other NDACC mobile lidars*
- *Validation of the Vaisala RS92 measurements throughout the troposphere and lower stratosphere*
- *Validation of multiple Total Precipitable Water measurements including GPS, microwave radiometer, and FT Spectrometers*

Participants: *17 Research groups from 8 institutions*

- *NASA-JPL, USA (8 Research Groups)*
- *NASA-GSFC, USA (2 Research Groups)*
- *NOAA-GMD, USA (1 Research Group)*
- *NCAR, USA (1 Research Group)*
- *DWD, Germany (1 Research Group)*
- *KIT, Germany (1 Research Group)*
- *LATMOS, France (1 Research Group)*
- *Univ. Toronto, Canada (1 Research Group)*



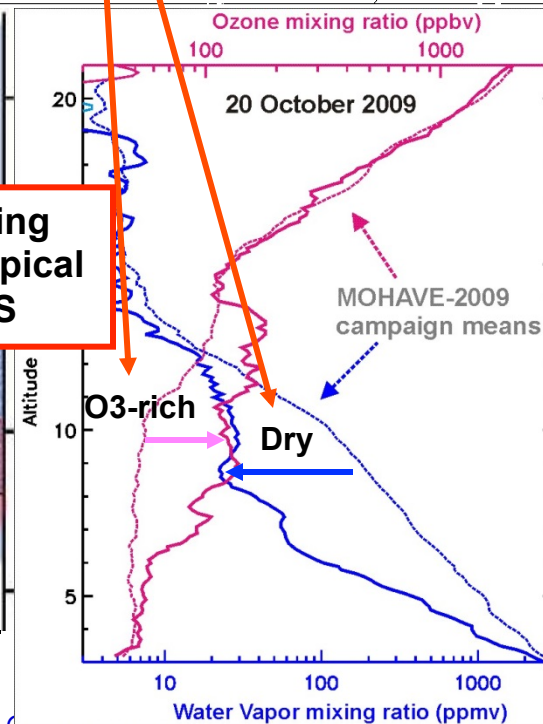
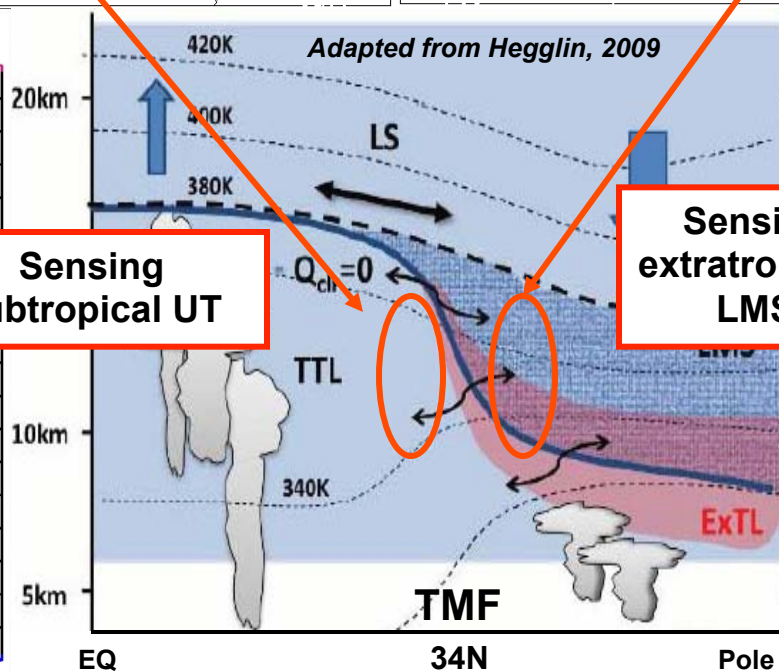
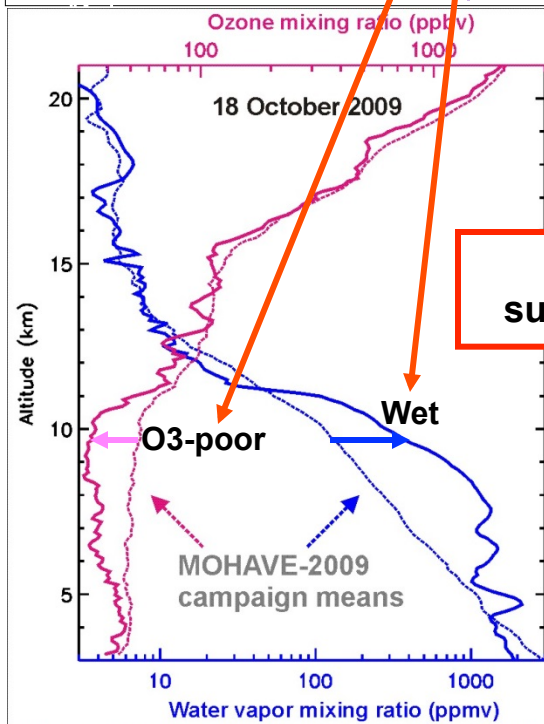
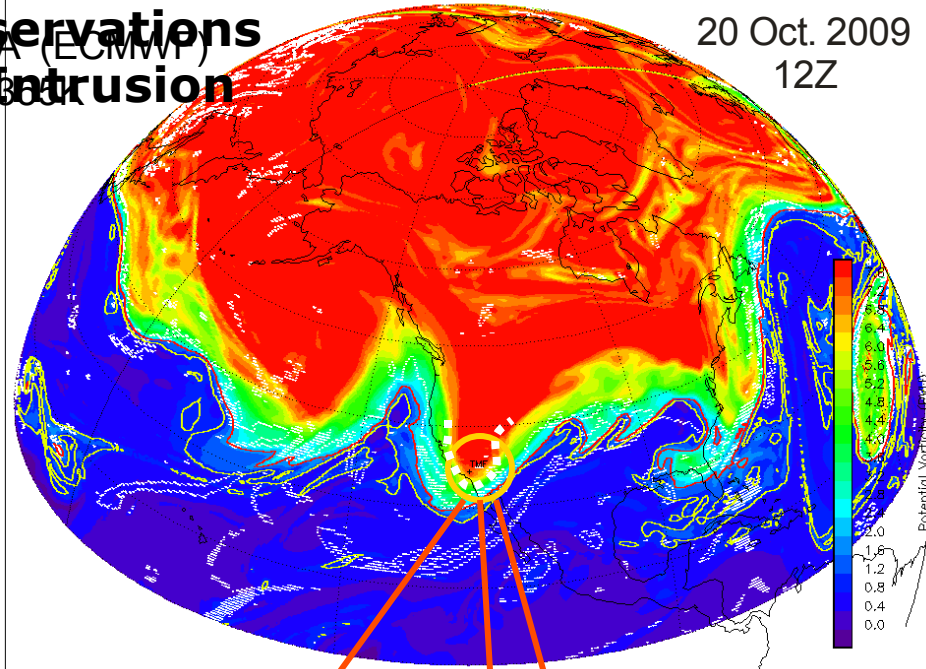
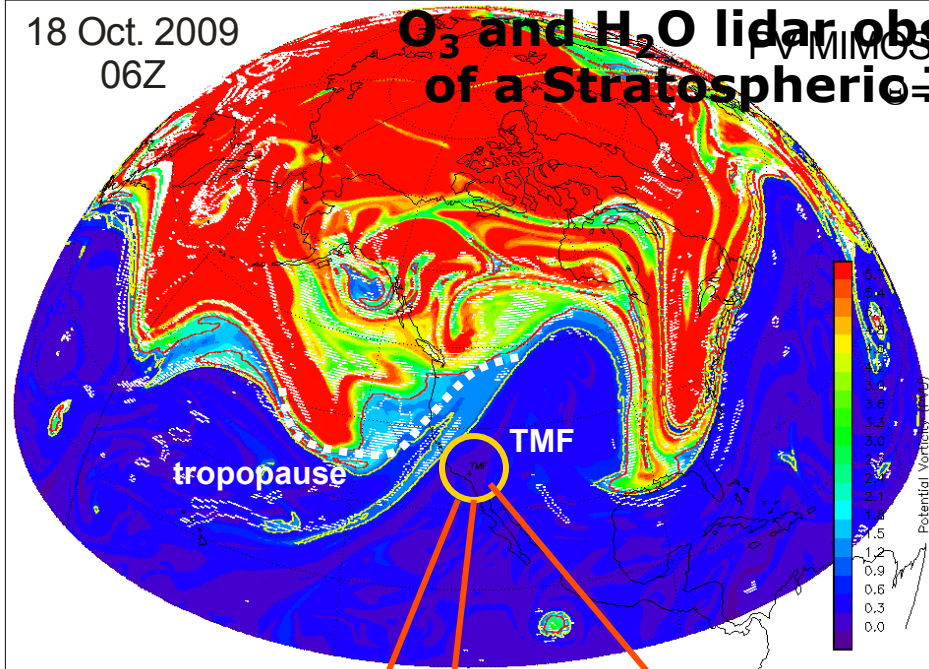
Instruments and target species



18 Oct. 2009
06Z

O₃ and H₂O lidar observations of a Stratospheric Intrusion

20 Oct. 2009
12Z



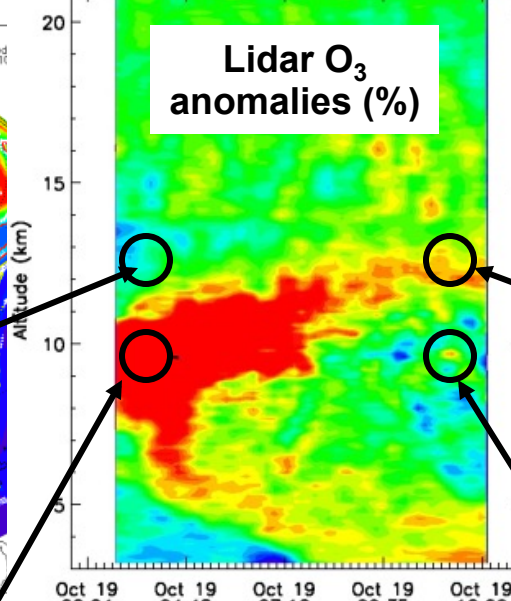


Oct. 19 O₃-H₂O anti-correlations and PV mans



PV 03Z
355 K

Mod
200911



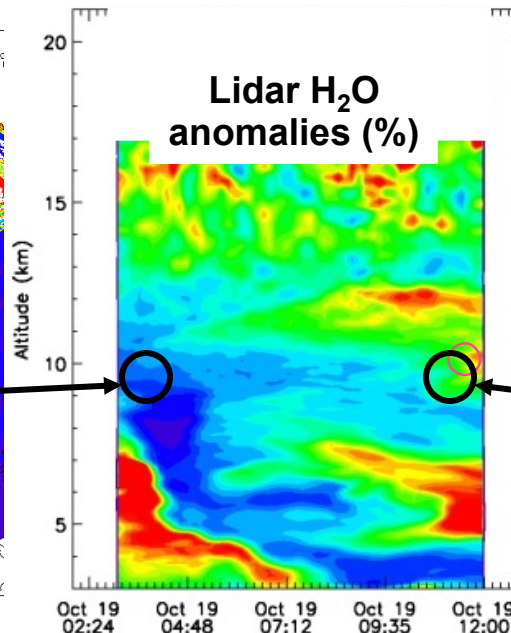
Lidar O₃
anomalies (%)

PV 12Z
355 K

Model Output:
20091019 12Z F000

PV 03Z
330 K

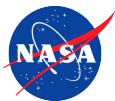
Mod
200911



Lidar H₂O
anomalies (%)

PV 12Z
330 K

Model Output:
20091019 12Z F000

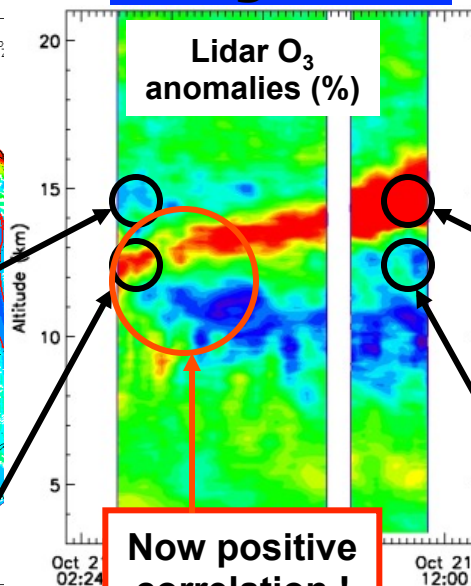


Oct. 21 (24 hours after the intrusion) Mixing?



PV 03Z
370 K

Model Outp
20091021 03:

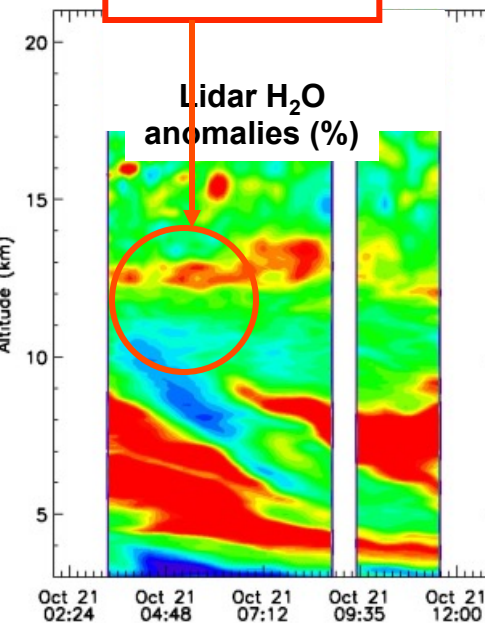


PV 12Z
370 K

Model Output:
20091021 12Z F000

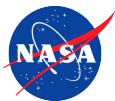
PV 03Z
350 K

Model Ou
20091021 :



PV 12Z
350 K

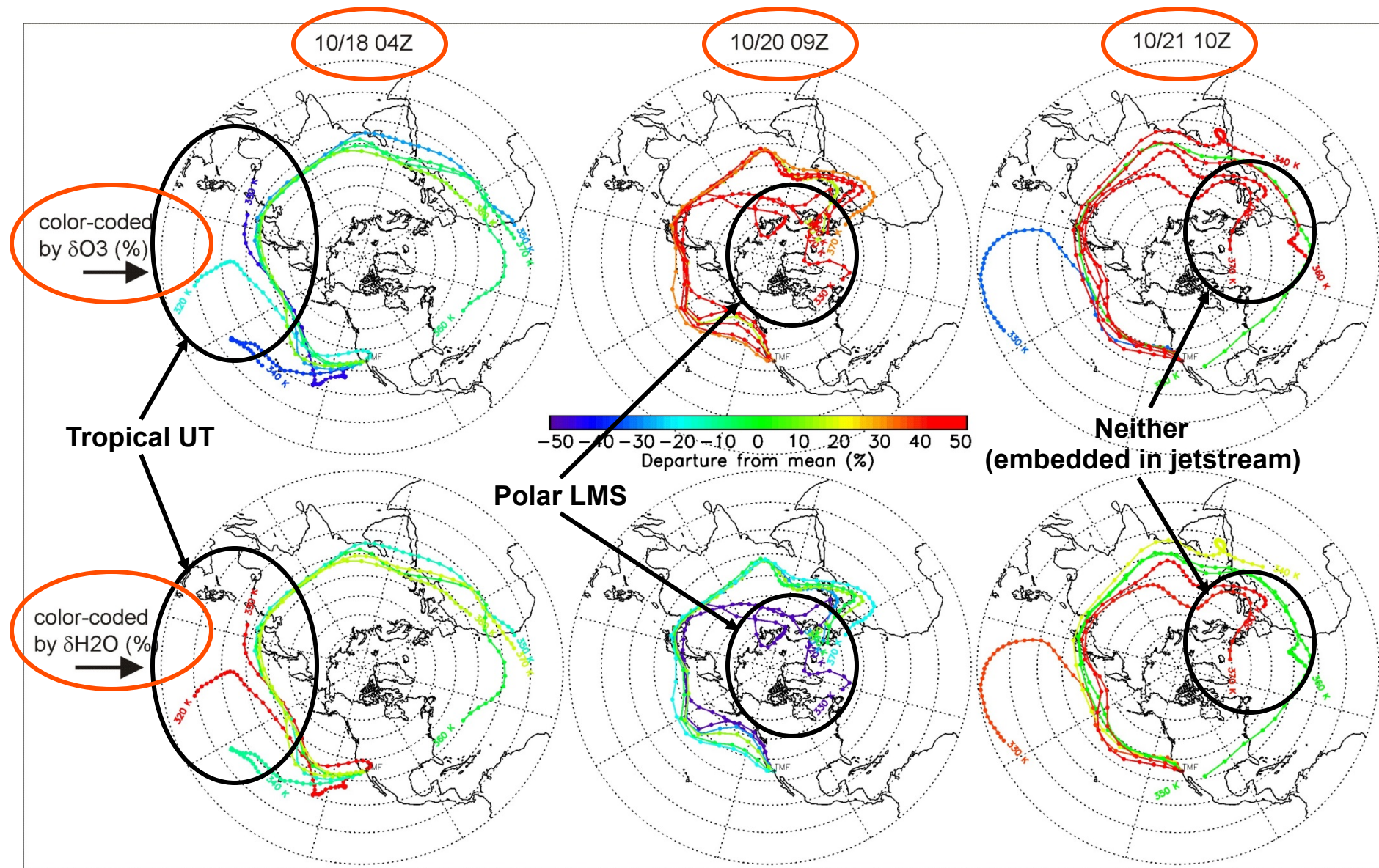
Model Output:
20091021 12Z F000



Origin of the air masses: tropical UT, polar LMS, and mixed along the jet-stream



10-day backward isentropic trajectories at levels between 320K and 370K





Conclusion



What was observed (which we already know):

- *Stratospheric intrusion identified by lidar as large O₃ VMR occurring simultaneously with dry layers*
- *Intrusions occurred along the subtropical jet-stream in a region of tropopause fold*
- *JPL-TMF seems to be a favorable location for the frequent observation of these intrusions*

What needs to be investigated further:

- How often and how deep these intrusions occur above JPL-TMF?
(Maria's job in the next several months)*
- Is there really mixing occurring at the core of the jet as suggested by the lidar observations of Oct. 21, 2009?*
- Use JPL-TMF lidar observations together with models to help to quantify transport and mixing processes involved*



And now...

**TOLNet science
since TOLNet**

(Maria's talk)